

**STAGE**

**LIGHTING**

**FOR SCHOOLS  
COLLEGES &  
TECHNICAL  
INSTITUTES**



"It is worth adding a note on the value of dramatic performances as an aid to appreciation. The drama has now a sure footing in all schools, and its usefulness in cultivating self-confidence and good speech and developing initiative need not be stressed here. But it also has its place as one of the best means of revealing the strength and beauty of great literature. This is of course primarily true of the actual performers ; it must be difficult to play a part in one of the great plays of Shakespeare without abiding profit. But it is also, for the school audience, one of the surest ways of communicating the secret of great literature".

*Board of Education. Report of  
the Consultive Committee on  
Secondary Education, Nov. 1933*

*Dennis Carter*  
*1938*

# **STAGE LIGHTING**

**FOR SCHOOLS, COLLEGES AND TECHNICAL INSTITUTES.**

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## INTRODUCTION.

The school stage is rapidly evolving into something more significant than the imperfectly equipped platform on which end-of-term plays are produced. In many schools the stage has assumed the importance of an Art Room or Science Laboratory. It has become a class-room or workshop where arts and crafts blend with literature and science. It has acquired educational value that is technical as well as intellectual and aesthetic.

The advent of electricity has produced a tremendous revolution in the social and economic life of the whole world. The Theatre proved particularly susceptible to that revolution and has both lost and gained in the impact. Modern theatre practice has been enormously improved and stage lighting is moving quickly from the merely utilitarian illumination of an acting area to the artistic control of intensity and direction of light and of colour to heighten the significance of the drama. The development has created a critically appreciative public and the need of a theatre personnel with technical education and a highly developed artistic sense. It is recognised that responsibility has been seriously undertaken by many educational authorities whose curricula, particularly in Technical Schools, have been adjusted, and stages equipped to deal with the problem.

The Strand Electric and Engineering Company has made a specialised study of theatrical lighting and has developed a large organisation for the provision of equipment capable of producing the effects demanded. It maintains a close contact with advanced thought and practice not only in the professional theatres and cinemas but in the schools and amateur theatres.

In recent years the provision of lighting equipment to be used on school stages has become a growing concern of the Company which has worked in close co-operation with many educational authorities and their technical consultants.

Local conditions vary considerably and in the absence of any generally accepted policy it is difficult to standardise the installations except within broad limits. There are, however, certain general principles that apply. It is the purpose of this brochure to discuss these principles and to make suggestions which may be helpful to those Educational Authorities, Architects, Principals, Headmasters and others who have to consider the provision of stage lighting in schools.

The examples submitted in the appendix are based on equipment actually installed in schools but as there are so many considerations involved, such as available space, nature and construction of roof, electrical supply, finances, etc., it is preferable for each scheme to receive individual consideration. Technical representatives are available for preliminary consultations and we invite those concerned to take advantage of this facility. An enquiry does not involve any obligation either actual or implied and our representatives may be relied on to consider each problem with the object of suggesting the most effective and flexible equipment possible within the limitations which may exist.

Demonstration theatres and showrooms are available at the London Office and the Manchester and Dublin Branches. An invitation is extended to all those interested in stage lighting to call at any of these addresses where they may examine standard equipment in operation.

Modern stage lighting makes considerable use of colour and it is desirable that the equipment installed should provide for this. Colour lighting is also becoming widely applied to decorative schemes outside the theatre and it is of considerable value to students to have at their disposal apparatus which enables them to experiment in the blending of colours. This knowledge is not merely of practical value but helps to develop a sensitivity to colour which is too frequently lacking, undeveloped or misunderstood.

Modern stage lighting equipment can produce effects appearing to the uninitiated as almost magical and provides the student with fascinating and instructive exercise. Too often in professional and amateur theatres is the value of lighting equipment discounted through lack of knowledge of its potentialities.

## STAGE LIGHTING EQUIPMENT.

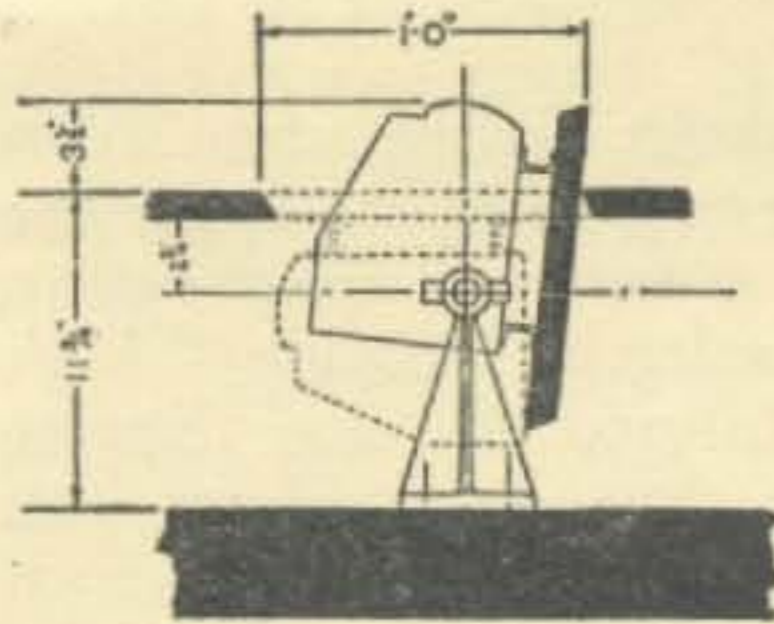
For ordinary theatrical purposes it is primarily necessary that the whole setting should be illuminated. The lighting should be evenly diffused. It should be easy for colour to be imparted, for the colours to be blended and for the intensity of light to be varied. It should also be possible to direct beams of light—again of varying intensity and colour—to any part of the stage in order to provide “high lights” . . . to give emphasis and to prevent the flattening effect of the general diffused lighting. Strong beams or floods of light to provide the effect of sunlight or moonlight shining through windows and doorways are often required. In outdoor scenes it is necessary to direct variable light on the sky-cloth or cyclorama (see footnote) to reproduce the innumerable light changes of day and night.

The selection of lighting equipment necessary to provide these effects is to a large extent determined by the size of the stage. The equipment required on most school stages may be summarised as under:—

1. Footlights.
2. Battens.
3. Flood Lanterns.
4. Focus Lanterns (more usually named Spotlights).
5. Stage Plugs (or Dips).
6. Switch and Dimmer Control Board.

*CYCLORAMA.*—This name was originally applied to a curved plaster dome which extended sufficiently high to dispense with borders in open air scenes. In practice it has been found that the disadvantages greatly outweigh the advantages, most of which may be obtained from the use of a flat wall, curtain or canvas cloth. The word cyclorama, is, however, generally used for these alternatives.

## Footlights.



A.1 PATTERN DISAPPEARING FOOTLIGHT

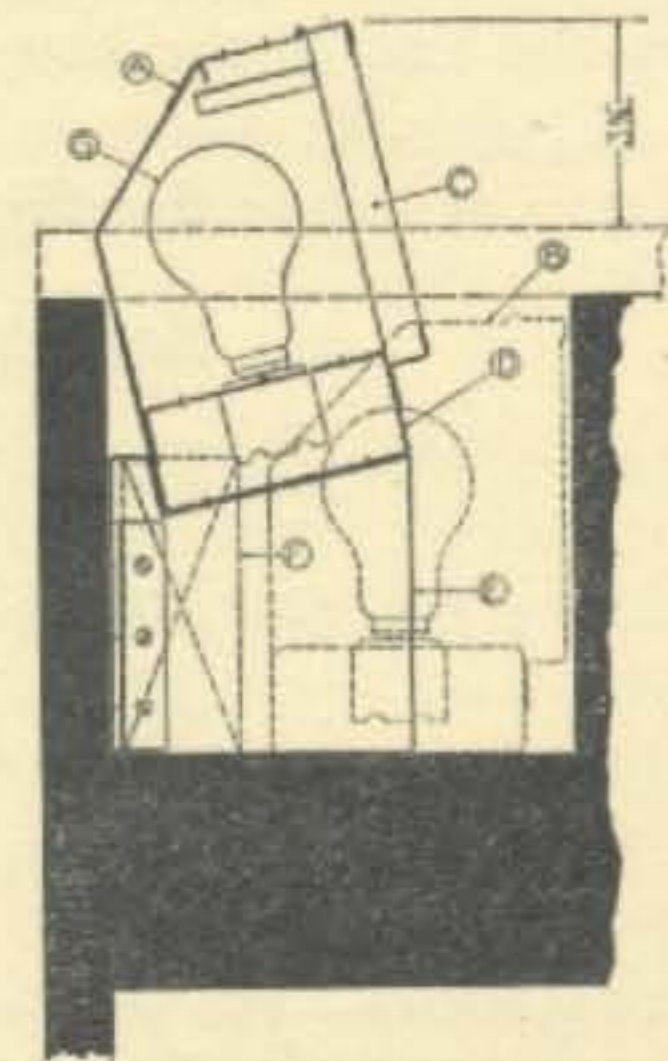
used and the inside of the metal shield is painted white to provide a reflecting surface.

The compartment type is undoubtedly the more efficient, providing better diffusion and blending of colour and has generally superseded the open type except where finance is the chief consideration.

The footlights are fitted to the front edge of the stage at a properly adjusted angle to the stage level. Diagrams indicating the correct adjustment will be supplied when required. It is a great advantage in schools to have footlights so fitted that they may be concealed in the floor of the stage when not required. It is desirable that the footlights should be wired for not less than three circuits, each separately controlled by switch and dimmer.

The use of footlights is deplored by some but still used by the majority. Generally speaking, to dispense with footlights necessitates the use of a greater number of Floods and Spots or, alternatively, of strips inside the proscenium arch. Footlights are required in most instances but it should be possible to control their intensity and if desired dispense with them temporarily.

Broadly there are two types of footlights. One consists of a series of separate compartments, each fitted with glass or metal reflector and a frame in which a colour medium can be placed. The other is an open trough with a curved metal shield behind; natural colour or dipped lamps are



CRIPPLEGATE PATTERN DISAPPEARING FOOTLIGHT



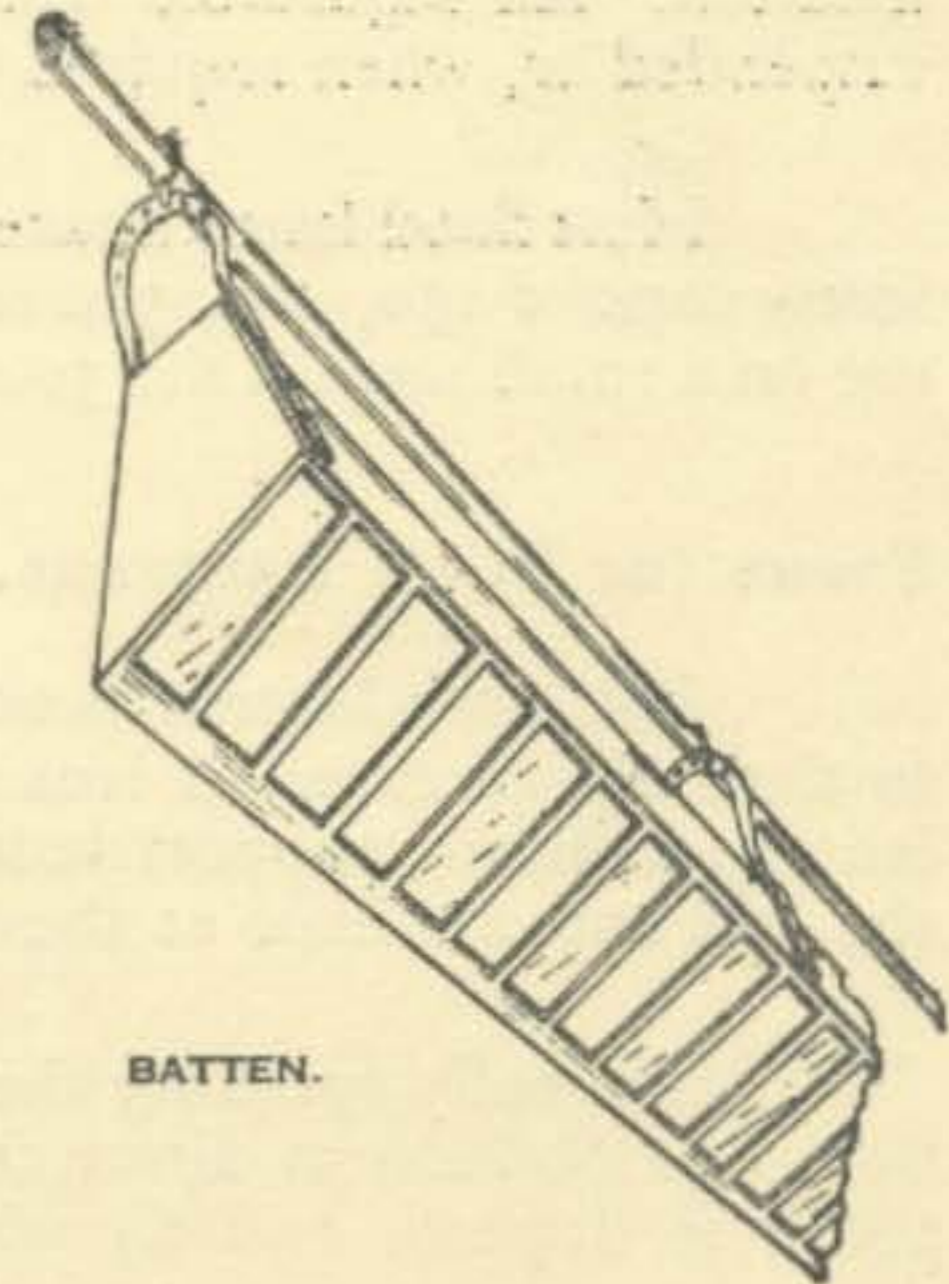
## Battens.

These are the rows of lights suspended above the acting area parallel to the footlights. A diffused light should be thrown downwards to illuminate the setting but to miss the borders. The number of battens to be used is determined by the effective depth of the stage.

In size and construction, battens are similar to footlights, being also available in either compartment or open trough type. The comparison in favour of the compartment type is even greater in the case of battens as there is less control of diffusion and usually too much escape of light *above* the open type battens.

The number of circuits is usually the same as used for the footlights and each circuit in each batten should be controlled separately or collectively at will. It is usual to fit 60 watt or 100 watt gas-filled lamps in footlights and battens. To obtain colour lighting with the open trough types it is preferable to use dipped lamps, sprayed or the more expensive coloured glass lamps not being recommended. The use of clear lamps with coloured gelatine in the compartment type often has the advantage of simpler and more economical maintenance.

Footlights and battens provide the general illumination of the stage. In many theatres and schools they provide the only available illumination. This restriction necessarily curtails the effectiveness of the lighting and reduces control mainly to intensity. In modern practice the No. 1 Batten, i.e., the one immediately behind the proscenium is either augmented or supplanted by a Spot Batten or combined Spot and Flood Batten. Often, for small stages a compromise is affected by having sections of battens with Spots or Floods between each section.



## Flood Lanterns

These lanterns are used for a variety of effects and vary accordingly in construction. They are generally required as portable apparatus and used to flood backcloths, etc., from the wings or sides of the stage. Frequently they are suspended to augment the batten. Certain types of flood lanterns are most usefully employed to direct vertical pools of light to sections of the acting area without allowing any escape to affect the background.

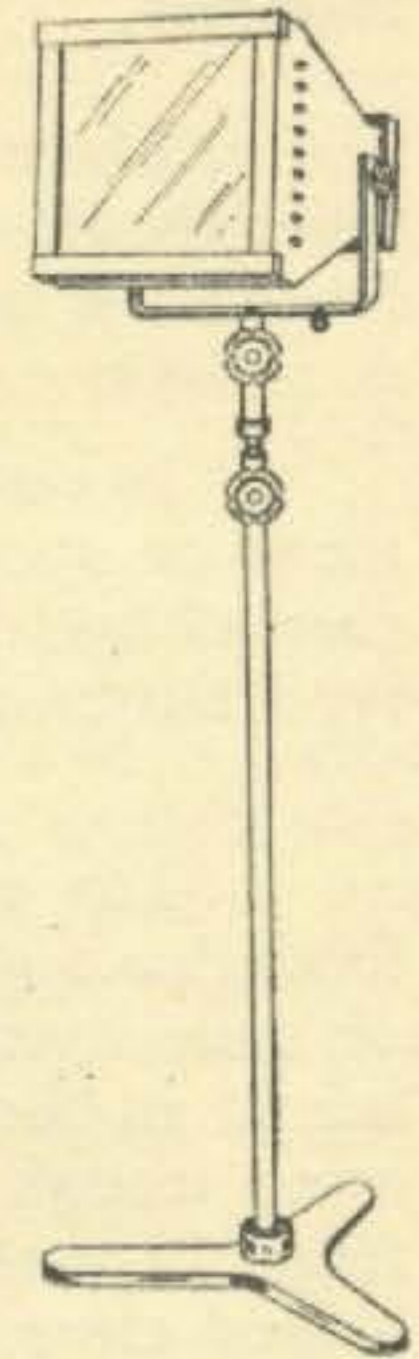
As will be seen from the illustration, the Wing Flood consists mainly of a sheet-metal housing fitted with a curved and corrugated glass reflector which determines the angle of the beam of light. Grooves in the front hold in position the frame containing the colour medium. An adjustable trunnion fork is fitted, by means of which the lantern may be suspended or, when required to be portable, fixed in a telescopic stand with a heavy base.

Most flood lanterns are made to accommodate General Service gas-filled lamps with screw caps of 150, 300, 500 or 1,000 watts capacity. The one which is probably of most use on a small stage is the 500 watt Wing Flood with a medium beam angle.

## Focus (or Spot) Lanterns.

The focus lantern is used to provide the necessary localised light—to add definition and dimension to the stage picture. A lens is mounted at the front of the sheet-metal housing while in the body of the lantern a sliding support holds a round bulb projector lamp. By adjustment of the lamp in relation to the lens and a mirror at the rear, the beam of light can be contracted or expanded.

Generally speaking the lanterns are the most useful when fixed to the No. 1 Batten. It is possible from that position to direct the beams of light to the most important points of the stage. Some producers prefer to dispense entirely with the No. 1 Batten and to substitute a row of Spot lanterns, sufficient in



WING FLOOD.

number and fixed at varying angles to ensure that the whole of the acting area is covered by overlapping beams of light. By controlling the colour and intensity of each beam it is possible to obtain highly significant lighting effects.

If an apron stage or forestage is used, or if footlights are dispensed with it is desirable that Spotlights should be fixed above the auditorium or high up on the side walls to direct beams of light at an angle of  $45^{\circ}$  to the front of the stage and prevent the actors from playing in shadow.

Spot lanterns vary chiefly in relation to the length of throw necessary. They are made to accommodate lamps of wattages of 250, 500 and 1,000.

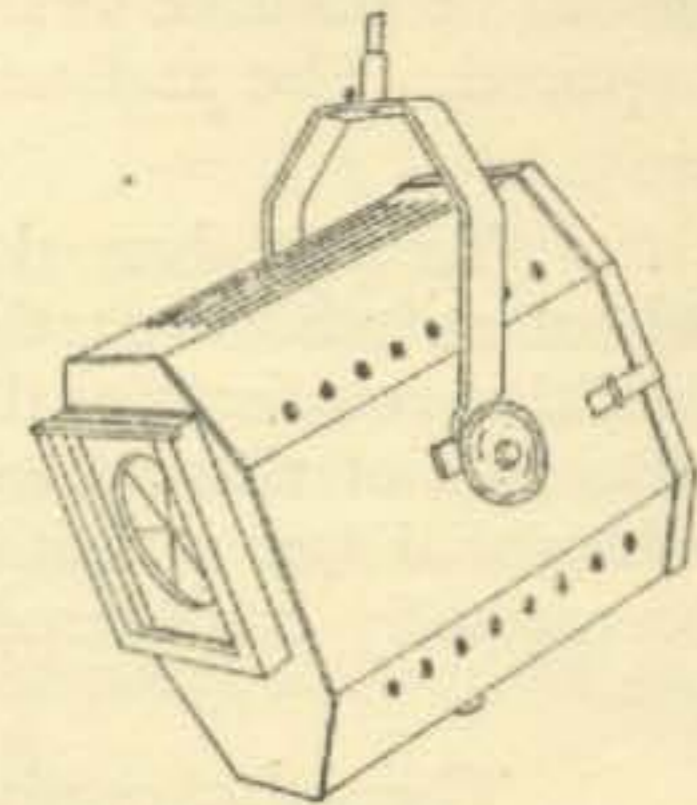
### Stage Plugs.

It is desirable to have not less than two sources of current supply in the stage floor between the proscenium and the back wall. Traps are cut in the stage, plug points inserted—wired to the switchboard, and a metal cover fixed. These traps are known as stage dips.

### Switchboard.

The switchboard may be regarded as the brain of the lighting system. Upon its flexibility must depend the effective use of the lighting equipment installed. A school switchboard may cost as little as £20 or as much as £200. and varies in relation to the size of the installation, the sub-division of the circuits and the extent to which dimmers are used individually and collectively.

The switchboard receives the main supply of current and controls its circuit to the sources of light. It should possess a main switch by means of which the whole installation may be "blacked out" simultaneously. Individual switches should control each separate colour circuit in the Footlights and in each Batten



SPOTLIGHT.

and each Spot Lantern, Flood Lantern and Stage Dip. The circuit from switch to light source should pass through a resistance or dimmer which may be separately controlled to vary the intensity of light. It should be possible to link together the whole or part of the dimming apparatus for collective control when required. The auditorium lighting should be subject to similar control from the stage switchboard.

To postulate the ideal is the essential preliminary to an ultimate compromise. In the case of school switchboards the compromise often depends on varying opinions of the relative importance of facilities required and finance available. A switchboard lacking flexibility may seriously reduce the efficiency of a most expensive lighting installation and prevent any future extension of control except at substantial loss of initial expenditure. It will be obvious, therefore, that the various alternatives should be carefully considered and thoroughly discussed before the switchboard is finally designed.

The switches may be of a simple type, operating at "on" or "off" positions. They may, however, have two "on" positions controlling the circuits either through or independently of the Master "Black-out."

The dimmers may be of the liquid type—which are not generally favoured, having many disadvantages and therefore not recommended—or metallic dimmers of either the slider or stud-contact type. Of the metallic dimmers the slider type is the cheaper but the stud-contact type more efficient and durable. The school switchboard usually includes the metallic dimmers, each constructed to resist the actual wattage of the circuit on which it is employed.

Certain technicians favour the adoption of what is known as a plug-dimming system whereby dimmers are fixed to the board and connected to the various circuits by a series of interchangeable plugs. By this method it is possible to use fewer dimmers and to connect the particular circuits requiring control as needed. There are many arguments against this method the chief being the liability to overload by connecting a circuit of greater wattage than the dimmer's capacity. There is also a tendency for the system to become excessively complicated.

When funds available have been restricted certain schools have wisely expended the maximum on a switchboard designed to provide for future additions, and the minimum on the lighting equipment. By wiring from the switchboard to essential points they are able to hire additional equipment when needed, or purchase as resources permit.

When necessary the switchboard can be made portable. When permanently installed it is often mounted on a platform at the side of the stage from which the operator has a view of the acting area. Sufficient space should be provided to enable the operator to work freely and when necessary to pass behind the board. The platform should be placed in a position which does not interfere with the setting or packing of the scenery. Adequate protection should be provided as a safeguard against dangerous interference by inquisitive juniors when the board is not in use.

The switchboard provides valuable facilities for technical instruction and its importance justifies the most careful consideration and discussion before its detailed construction is decided.

### **Curtain Settings.**

Many schools have wisely decided that it is not only more artistically satisfying but also more economical to use curtain settings in preference to unconvincing pseudo-realistic scenery. Aided by a flexible lighting equipment an imaginative arrangement of draperies frequently provides a suggestive setting of extraordinary attraction. The materials, shades and sizes of the stage curtains to be used with colour lighting equipment should be carefully selected and planned. The Company's representatives are able to give valuable advice not merely with regard to the supply of suitable materials but also the equipment necessary for the best and most flexible arrangement of the curtains

### **New Equipment in Old Schools.**

Very few old schools have been planned to provide permanent stages on which it is possible to erect permanent lighting installations. In many cases it is possible to convert existing platforms and at no

very considerable expense erect a semi-permanent proscenium and provide lighting equipment that need not be removed and stored after use. In those other schools where this is not possible portability of the equipment becomes extremely important.

Our staff of technical representatives includes men who have had practical experience of temporary fit-up stages in schools and halls of almost unbelievable inconvenience and when any conversion is being considered they are able to offer advice not merely with regard to the problems of lighting but also the planning of the stage itself.

### **Stages in New Schools.**

It has been found on many occasions that close and friendly co-operation with architects in the initial consideration of plans has made it possible for adjustments to be made with great advantage to the ultimate users of the stages, without any increase in building costs or material alteration of general design. There are numerous points on which an exchange of opinion and discussion of technical details may be profitable.

The provision of adequate lighting must necessarily be affected by the general design and equipment of the stage. It is desirable, therefore, that the problems of the various sections should be considered in relation to each other. Although the Company's chief concern is with the lighting equipment, they are always willing to co-operate in a general consultative capacity with Architects and other Authorities, who may be responsible for the planning of new schools, halls or other buildings in which stages are to be included.

### **Hire Service.**

It is realised that many schools, though recognising the desirability of installing stage lighting equipment, have not the funds available for its purchase. All such equipment may, however, be hired at very reasonable charges. Complete installations are available including Footlights, Battens, Spotlights,

Floods and portable Switch and Dimmer Boards with individual and collective control. Large hire stocks of standard equipment and special effects are held at the Company's depots in London, Manchester and Dublin. It is also possible, when there is some doubt about the equipment to be permanently installed, for experiments to be made with hired lanterns, etc., at a modest cost.

Some schools prefer to adopt a practice not unusual in professional theatres where a simple permanent installation is available and all spots and floods are hired to meet the varying requirements for each separate production.

### **Safety Factor.**

Many consultants connected with Educational Committees have frequently expressed their grave concern regarding the dangers to which school children are subjected when dealing with badly designed lighting equipment. Theatres are properly compelled to conform to very stringent Home Office regulations to ensure that every possible safeguard is adopted against danger through use or misuse. All reputable firms of lighting engineers design their equipment to conform to regulated requirements for the particular purposes for which such equipment is intended. It is very desirable, therefore, that in considering the requirements for the lighting of school stages there should be consultation with a firm whose business has necessitated a close study of all conditions governing the provision of a liberal margin of safety.

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In conclusion the Strand Electric Company wishes to reiterate its desire to co-operate wholeheartedly with all those responsible for the development of this section of education, so important to the cultural life of the community. Men of the theatre created this organisation, which shares the theatre's traditions and its future. The Company welcomes, therefore, the evident efforts of Educational Authorities to create an intelligent appreciation of the comparatively new art of stage lighting and assures those who may read this brochure that its Showrooms, Demonstration Theatres, Technical Representatives and Publications are at the disposal of all whose interest in the subject prompts them to seek Strand Service.

## APPENDIX.

### Examples of School Stage Lighting.

The following details and drawings will give some indication of equipment which has actually been installed in certain schools. It is not suggested that any one scheme represents the ideal but in each case an attempt has been made to meet local needs and financial resources. It is possible to extend or temporarily augment the apparatus if required.

Simple apparatus has been supplied at a cost of less than £40, whereas many of the larger Technical Colleges, Public Schools, etc., have purchased equipment involving several hundreds of pounds.

Whether the need is for simple or extensive lighting, it is very desirable that alternative schemes should be discussed in detail, preferably before any constructional work is undertaken.

### EXAMPLE I.

This represents the bare minimum for illuminating a stage and is only suitable for very shallow stages where no great flexibility is required. We would point out however, that layouts such as this can be planned to allow easy expansion.

#### 1. Footlights.

A length of compartment footlight with gelatines, etc., wired for three circuits and constructed so that they can easily be stored away when not in use.



2. **No. 1 Batten.**

A Magazine batten designed for fixing behind the proscenium opening, also wired for three circuits.

3. **Stage Plugs.**

Two stage plugs, one at each side of the stage for floods, etc.

4. **Switchboard.**

One simple control board consisting of an ironclad board fitted with switches and slider dimmers for the footlight and batten but with switches only for the floods. The whole being controlled by a suitable ironclad blackout switch.

**EXAMPLE 2.**

This example is for the small hall seating about 100 to 150 people with a 12-ft. deep Stage, a proscenium opening of 15-ft. and a height of 10-ft. with ceiling height between 12-ft. and 14-ft.

This suggestion is also applicable to the portable fit-up stage, where the apparatus has to be dismantled and stored when the hall is not used for dramatic purposes.

1. **Front of House Lighting.**

Two 500 watt focus lanterns from side walls on to apron stage and acting area. These two lanterns to be on one circuit.

2. **No. 1 Batten.**

A composite batten consisting of a barrel on which are fixed six 150 watt Baby Floods wired in pairs and five 250 watt Spots, each on a separate circuit.

3. **No. 2 Batten.**

A length of barrel carrying six 150 watt Baby Floods wired in pairs.

4. **Stage Plugs.**

One on each side of the stage in parallel.

5. **Switchboard and Dimmers.**

If a permanent stage, similar to that for Example No. 1., but with twelve Dimmers, or alternatively if for a portable stage, then a 12-way slider pattern Switch Fuse and Dimmer Board.

Note: No Footlight is suggested for economical reasons, but of course can be included if desired.

### **EXAMPLE 3.**

The scheme in this case gives a much greater degree of selectivity than Example 1. The stage in question is assumed to be about 20-ft. deep with a 5-ft. apron, the proscenium being 24-ft. wide by 11-ft. high.

1. **Front of House Lighting.**

Two 500 watt focus lanterns from side walls on to apron stage and acting area. These two lanterns to be on one circuit.

2. **Footlights.**

Two lengths of magazine "C" type School pattern footlight arranged for easy connection in the centre by means of plug connectors. The footlights wired for three circuits and can be used as proscenium strips if desired when the apron stage is being used.

3. **No. 1 Batten.**

A composite batten consisting of two short sections of magazine batten wired for three circuits, and four baby Spots. The batten sections give a good general illumination over the acting area whilst the spots impart the high lights and directional lighting.

4. **No. 2 Batten.**

A magazine type Batten wired for three colours.

5. **Stage Plugs.**

These are placed in traps one on each side of the stage, there being two circuits in each.

6. **Switchboard.**

Of standard type with dimmer regulator, consisting of a substantial iron frame on which is mounted a bank of dimmers, there being a Sunset dimmer for every circuit, each arranged for individual and collective control. Above the dimmers and on the same framework a high grade

insulated panel on which is mounted all the circuit switches, fuses, etc., the switches being two-way-and-off thus allowing any circuit to be connected through or independent of the Blackout Switch at will.

Note: This type of Board lends itself to an economical layout, as if funds do not permit of the whole scheme being installed at the commencement, then the switchboard should be constructed with the switches and fuses for all circuits and those dimmers for which funds will allow, with space left on the framework so that the remaining dimmers can be added at a later date.

#### **EXAMPLE 4.**

This is an equipment suitable for a large school stage (proscenium 26-ft. depth 20-ft. height to grid 26-ft. proscenium opening 14-ft. high) where a great deal of dramatic work is done.

1. **Front of House Lighting.**

Two focus lanterns 1,000 watt each, independently controlled.

2. **Footlights.**

Three colour magazine footlight.

3. **No. 1 Batten.**

Composite batten consisting of two sections of magazine batten between which are placed two 500 watt Baby Spots, with a further one at each end.

4. **Acting Area Lanterns.**

Mid stage lighting consisting of two 1,000 watt acting area lanterns mounted on an easily lowered barrel. The lanterns independently controlled.

5. **Cyclorama top lighting.**

A specially designed compartment batten wired for three circuits, placed about 6-ft. from the top of the Cyclorama proper.

6. **Cyclorama bottom lighting.**

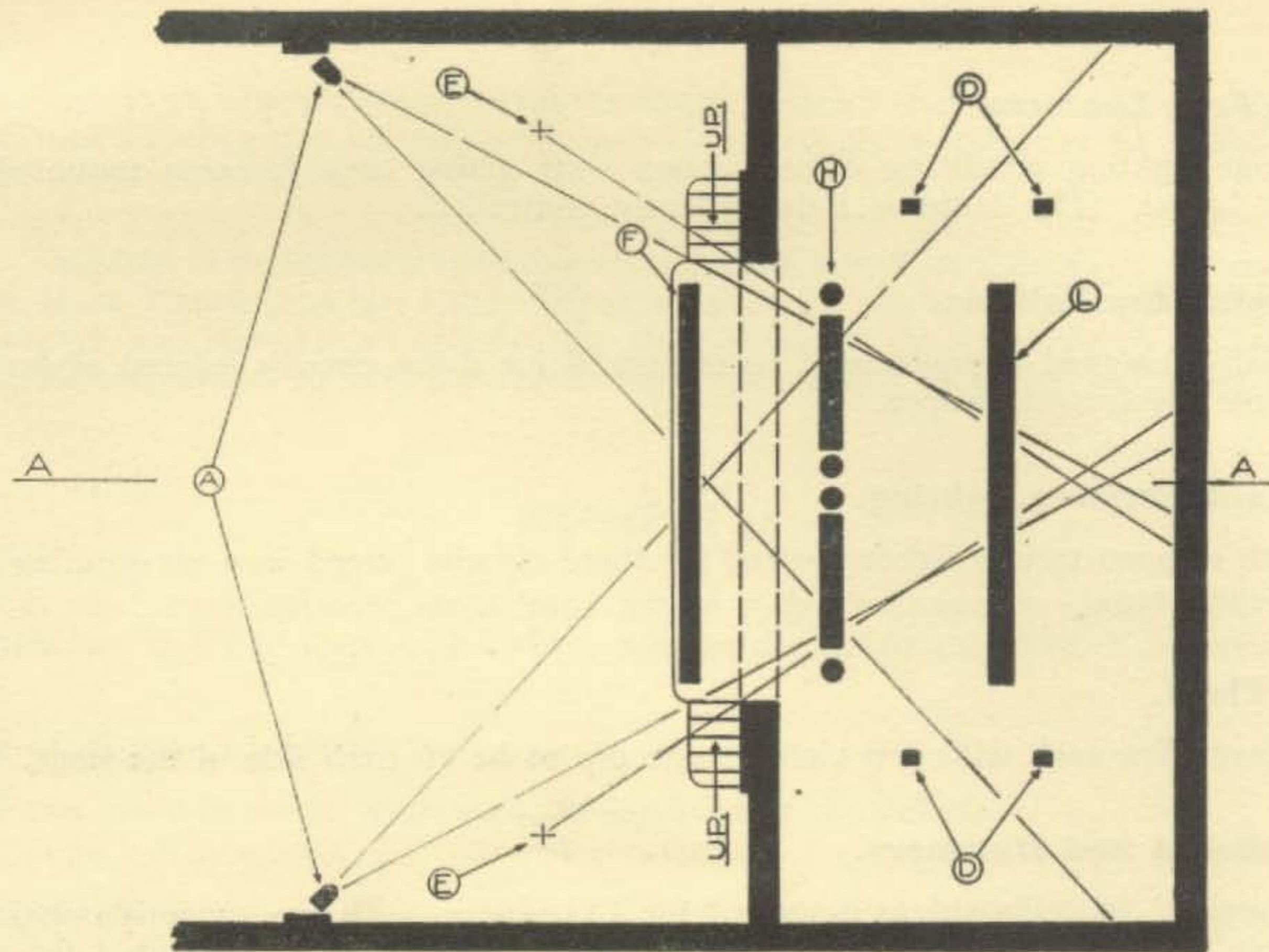
A length of open trough lighting wired for three circuits placed in a pit running along the base of the cyclorama.

7. **Stage Plugs.**

Two stage Dips each with two circuits, one dip to be on each side of the stage.

8. **Switchboard and Dimmers.**

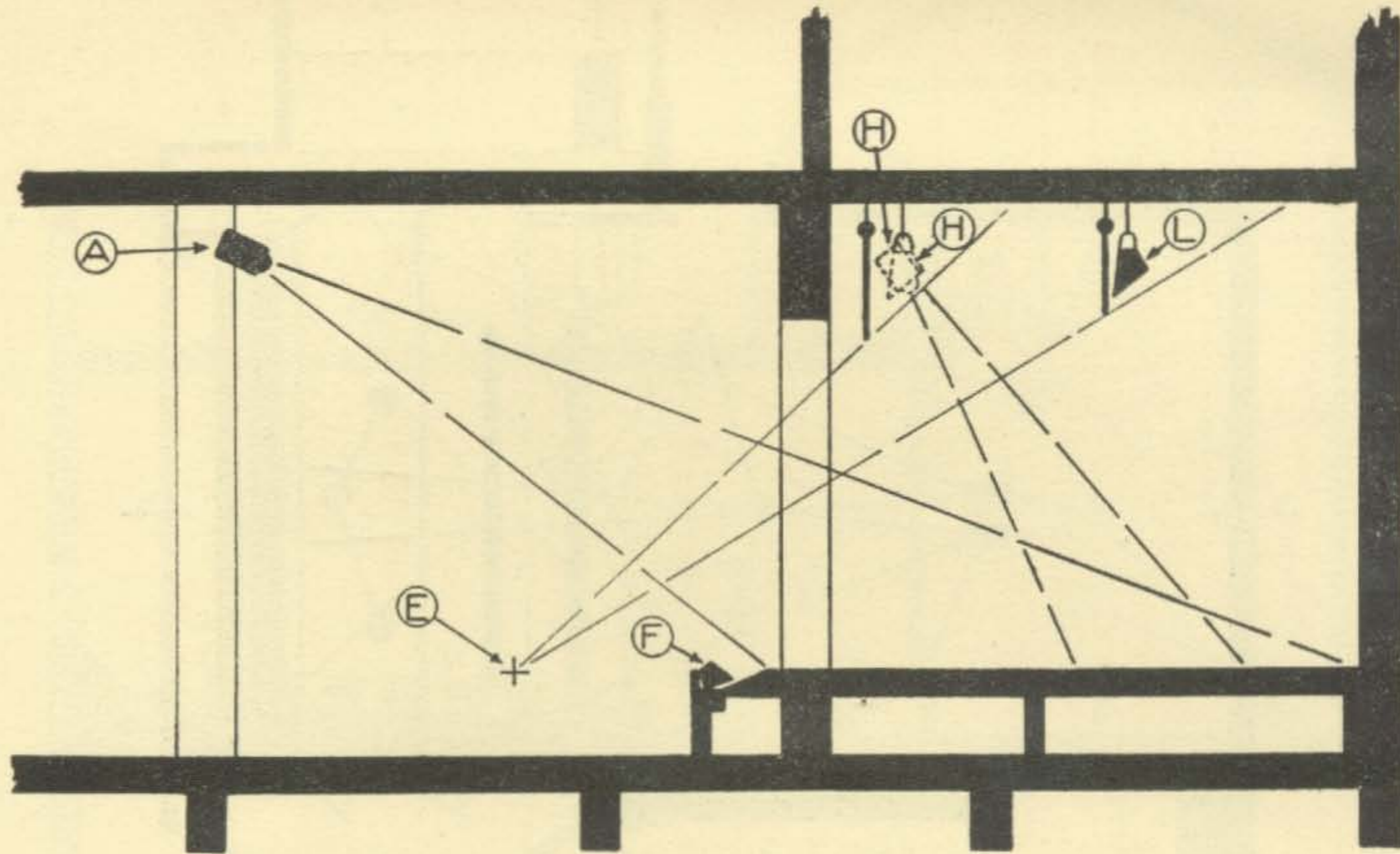
One standard Switchboard as described for Example 2, with the exception that the Cyclorama Dimmers must be fitted with scales so that the intervals can be recorded for reproduction of the effect.



- PLAN -

Key for suggested lighting of school stage.

- A. Front of house, spotlights used to flood fore-stage.
- D. Stage plugs.
- E. Sight lines of spectators.
- F. Footlight.
- H. Spot and magazine batten.
- L. No. 2 Magazine batten.

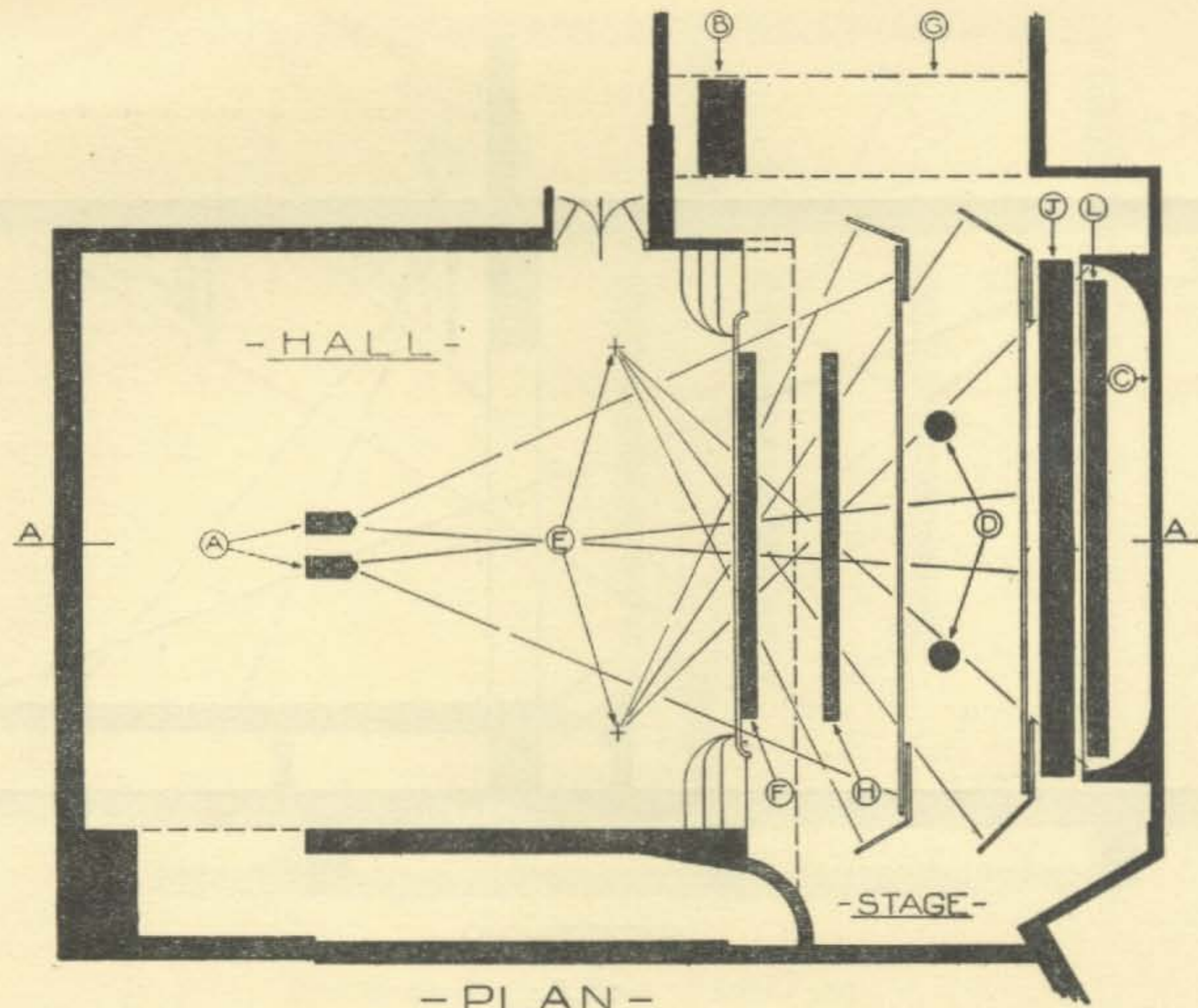


-SECTION-

A.A.

Key for suggested lighting of school stage.

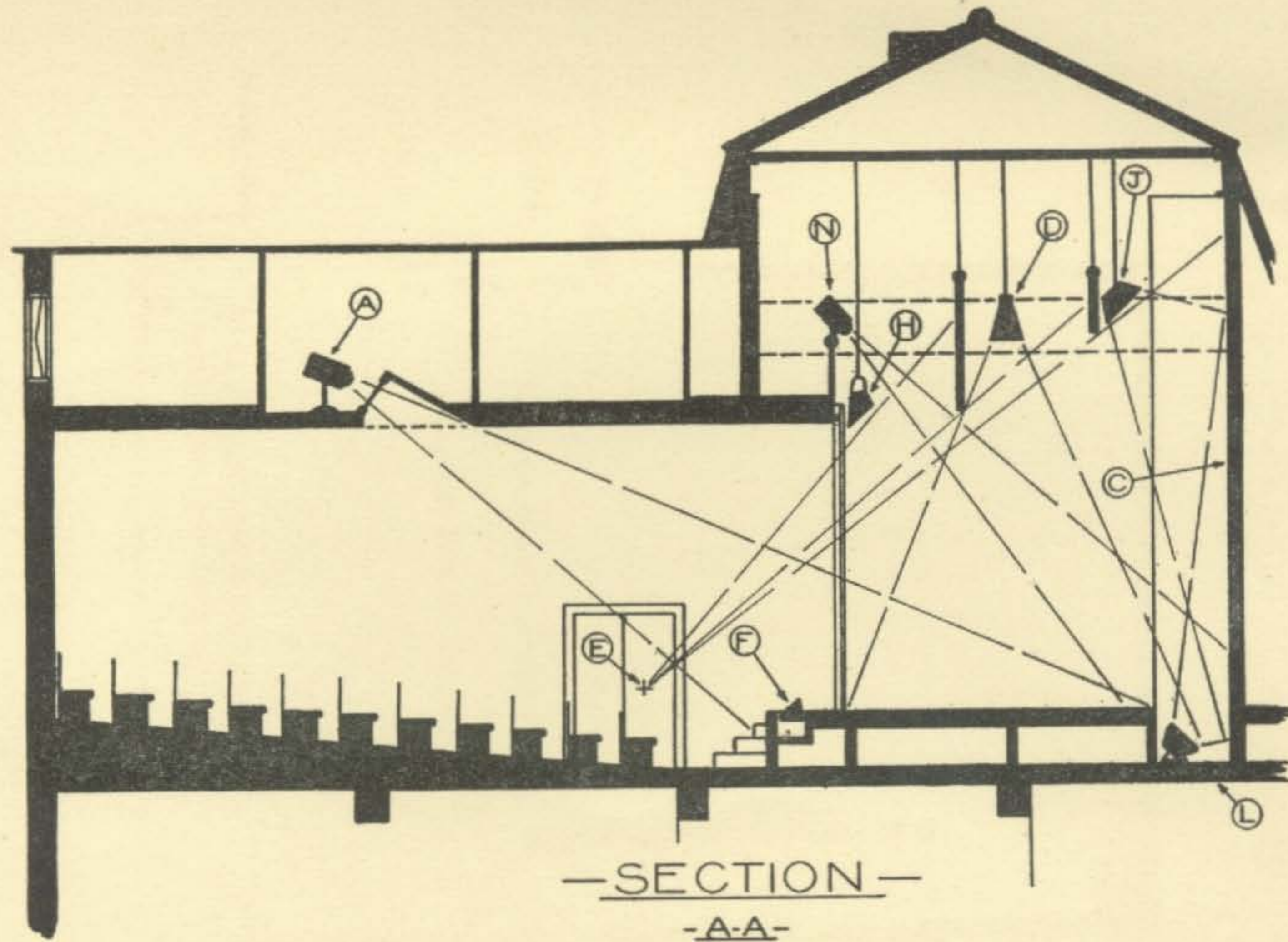
- A. Front of house spotlights used to flood fore-stage.
- E. Sight lines of spectators.
- F. Footlight.
- H. Spot and magazine batten.
- L. No. 2 Magazine batten.



Key for lighting school stage including cyclorama.

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|---|---|
| <p>A. Front of house spot lights to flood fore-stage and acting area.</p> <p>B. Switchboard and dimmer regulator.</p> <p>C. Cyclorama.</p> <p>D. Acting area lanterns.</p> <p>E. Sight lines of spectators.</p> | <p>F. Footlight.</p> <p>G. Fly gallery.</p> <p>H. Magazine batten.</p> <p>J. Cyclorama top lighting.</p> <p>L. Cyclorama bottom lighting.</p> |
|---|---|





Key for lighting school stage including cyclorama.

- |  |                               |
|--|-------------------------------|
| A. Front of house spot lights to flood fore-stage and acting area. | F. Footlight.                 |
| C. Cyclorama   | H. Magazine batten.           |
| D. Acting area lanterns.   | J. Cyclorama top lighting.    |
| E. Sight lines of spectators.                                      | L. Cyclorama bottom lighting. |
|  | N. Bridge spotlights.         |